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# CBSE 12th Physics 2009 Unsolved Paper Delhi Board

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# CBSE 12th Physics 2009 Unsolved Paper Delhi Board

TIME - 3HR. | QUESTIONS - 30

THE MARKS ARE MENTIONED ON EACH QUESTION

## SECTION - A

**Q.1. What is sky wave propagation? 1 mark**

**Q.2. Write the following radiations in ascending order in respect of their frequencies:  
X-rays, microwaves, UV rays and radio waves. 1 mark**

**Q.3. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid. Why? 1 mark**

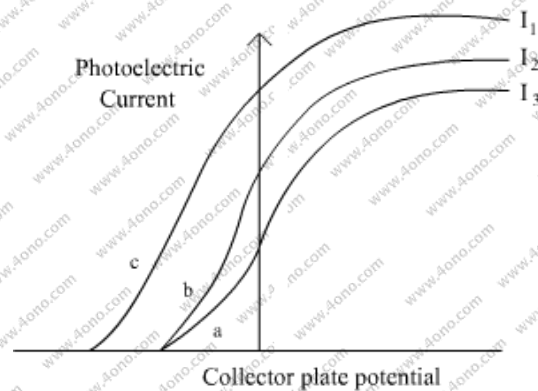
**Q.4. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? 1 mark**

Lenses	Power (p)	Aperture (A)
L1	3D	8cm
L2	6D	1cm
L3	10D	1cm

**Q.5. If the angle between the pass axis of polarizer and the analyzer is  $45^\circ$ , write the ratio of the intensities of original light and the transmitted light after passing through the analyzer. 1 mark**

**Q.6. The figure shows a plot of three curves a, b, c showing the variation of photocurrent vs collector plate potential for three different intensities  $I_1, I_2$  and  $I_3$  having frequencies  $\nu_1, \nu_2$  and  $\nu_3$  respectively incident on a photosensitive surface. 1 mark**

**Point out the two curves for which the incident radiations have same frequency but different intensities.**



**Q.7.** What type of wave front will emerge from a (i) point source, and (ii) distant light source? *1 mark*

**Q.8.** Two nuclei have mass numbers in the ratio 1: 2. What is the ratio of their nuclear densities? *1 mark*

SECRETION - B

**Q.9.** A cell of emf 'E' and internal resistance 'r' is connected across a variable resistor 1 'R'. Plot a graph showing the variation of terminal potential 'V' with resistance R. Predict from the graph the condition under which 'V' becomes equal to 'E'. *2 mark*

**Q.10.** (i) Can two equipotential surfaces intersect each other? Give reasons. (ii) Two charges - q and +q is located at points A (0, 0, - a) and B (0, 0, +a) respectively. How much work is done in moving a test charge from point P (7, 0, 0) to Q (- 3, 0, 0)? *2 mark*

**Q.11.** By what percentage will the transmission range of a TV tower be affected when the height of the tower is increased by 21%? *2 mark*

**Q.12.** Derive an expression for drift velocity of free electrons in a conductor in terms of relaxation time. *2 mark*

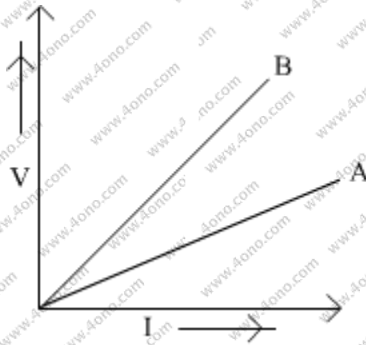
**Q.13.** An infinite number of charges, each of coulomb, are placed along x-axis at  $x = 1\text{m}$ ,  $3\text{m}$ ,  $9\text{m}$  and so on. Calculate the electric field at the point  $x = 0$  due to these charges if all the charges are of the same sign. *2 mark*

**Q.14.** A sphere  $s_1$  of radius  $r_1$  encloses a charge Q, if there is another concentric sphere  $s_2$  of the radius  $r_2$  ( $r_2 > r_1$ ) and there are no additional charges between  $s_1$  and  $s_2$ . Find the ratio of electric flux through  $s_1$  and  $s_2$ . *2 mark*

**Q.15.** A TV tower has a height of 150 m. By how much the height of tower be increased to double its coverage range? *2 mark*



Q.16. V-I Graph for parallel and series combination of two metallic resistors are shown in adjoining figure. Which graph represents parallel combination? 2 mark

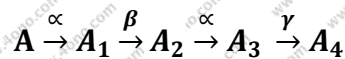


Q.17. Why are high frequency carrier waves used for transmission? 2 mark

Or

What is meant by term 'modulation'? Draw a block diagram of simple modulator for obtaining an AM signal.

Q.18. A radioactive nucleus 'A' undergoes a series of decays according to the following scheme:

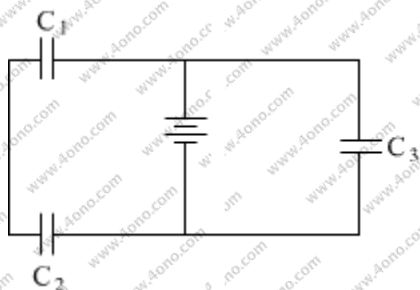


The mass number and atomic number of A are 180 and 72 respectively. What are these numbers for A<sub>4</sub>? 2 mark

SECTION - C

Q.19. A thin conducting spherical shell of radius R has charge Q spread uniformly over its surface. Using Gauss's law, derive an expression for an electric field at a point outside the shell. Draw a graph of electric field E(r) with distance r from the Centre of the shell for  $0 \leq r \leq \infty$ . 3 marks

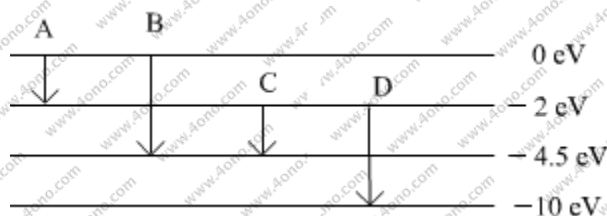
Q.20. Three identical capacitors  $C_1$ ,  $C_2$  and  $C_3$  of capacitance  $6\mu\text{F}$  each are connected to a 12 V battery as shown. 3 marks



**Find**

- (i) charge on each capacitor
- (ii) equivalent capacitance of the network
- (iii) energy stored in the network of capacitors

**Q.21. (a) The energy levels of an atom are as shown below. Which of them will result in the transition of a photon of wavelength 275 nm? 3 marks**



**(b) Which transition corresponds to emission of radiation of maximum wavelength?**

**Q.22. A proton and an alpha particle are accelerated through the same potential. Which one the two has (i) greater value of de-Broglie wavelength associated with it, and (ii) less kinetic energy? Justify your answers. 3 marks**

**Q.23. In a single slit diffraction experiment, when a tiny circular obstacle is placed in the path of light from a distant source, a bright spot is seen at the Centre of the shadow of the obstacle. Explain why? 3 marks**

**State two points of difference between the interference pattern obtained in Young's double slit experiment and the diffraction pattern due to a single slit.**

**Q.24. (a) Define self-inductance. Write its S. I. units.**

**(b) Derive an expression for self-inductance of a long solenoid of length  $l$ , cross-sectional area  $A$  having  $N$  number of turns. 3 marks**

**Q. 25. The figure shows experimental set up of a meter bridge. When the two unknown resistances  $X$  and  $Y$  are inserted, the null point  $D$  is obtained 40cm from the end  $A$ . When a resistance of  $10\Omega$  is conected.  $Q$  is connected in series with  $X$ , the null point shifts by 10 cm. Find the position of the null point when the  $10\Omega$  resistance is instead connected in series with. resistance ' $Y$ '. Determine the values of the resistances  $X$  and  $Y$ . 3 marks**

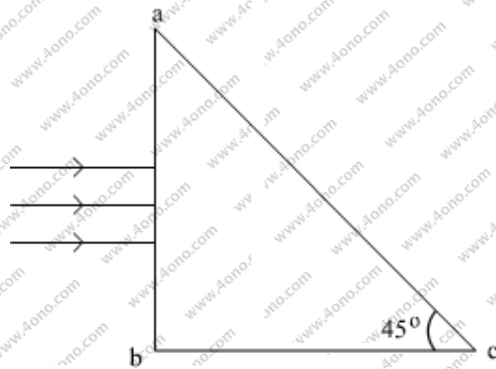


Q.26. Derive the expression for force per unit length between two long straight parallel current carrying conductors. Hence define one ampere. 3 marks

OR

Explain the principle and working of a cyclotron with the help of a schematic diagram. Write the expression for cyclotron frequency.

Q.27. Three light rays red (R), green (G) and blue (B) are incident on a right angled prism 'abc' at face 'ab'. The refractive indices of the material of the prism for red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Out of the three which color ray will emerge out of face 'ac'? Justify your answer. Trace the path of these rays after passing through face 'ab'. 3 marks



#### SECTION - D

Q.28. (a) Derive an expression for the average power consumed in a series LCR circuit connected to a c. source in which the phase difference between the voltage and the current in the circuit is  $\phi$ .

(b) Define the quality factor in an a.c. circuit. Why should the quality factor have high value in receiving circuits? Name the factors on which it depends. 5 marks

Or

(a) Derive the relationship between the peak and the value of current in an a.c. circuit.

(b) Describe briefly, with the help of a labelled diagram, working of a step-up transformer.

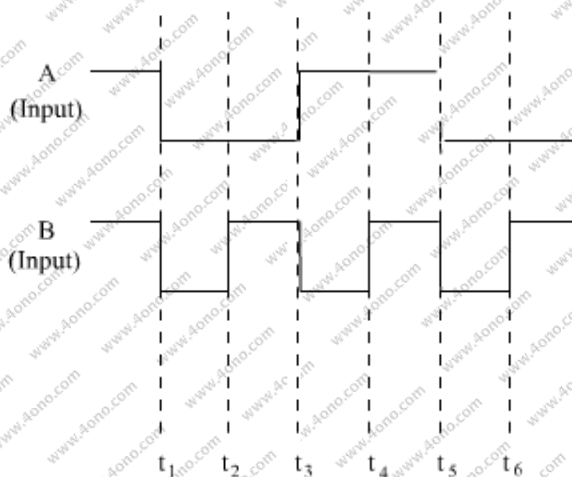
A step-up transformer converts a low voltage into high voltage. Does it not violate the principle of conservation of energy? Explain.

Q.29. (i) Draw a circuit diagram to study the input and output characteristics of an n-p-n transistor in its common emitter configuration. Draw the typical input and output characteristics.

(ii) Explain, with the help of a circuit diagram; the working of n-p-n transistor as a common emitter amplifier. 5 marks

Or

The given input A, B are fed to a 2-input NAND gate. Draw the output wave form of the gate.



**Q.30.** Trace the rays of light showing the formation of an image due to a point object placed on the axis of a spherical surface separating the two media of refractive indices  $n_1$  and  $n_2$ . Establish the relation between the distances of the object, the image and the radius of curvature from the central point of the spherical surface. Hence derive the expression of the lens maker's formula. *5 marks*

Or

Draw the labelled ray diagram for the formation of image by a compound microscope. Derive the expression for the total magnification of a compound microscope. Explain why both the objective and the eyepiece of a compound microscope must have short focal length.



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